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APPLICATION NO	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO
09 990,862	11 13 2001	Jung-Yu Hsieh	JCLA7288	2708

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EXAMINER

LE, THAO X

ART UNIT

PAPER NUMBER

2814

DATE MAILED: 04 05 2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/990,862

Applicant(s)

HSIEH ET AL.

Examiner

Thao X Le

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) ____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 8-9 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claims 8, material with high dielectric constant than silicon oxide would have lower band gap than that of silicon oxide.

In claim 9 requires a dielectric layer having high dielectric constant comprises materials Al_2O_3 , Y_2O_3 , ZrSi_xO_y , HfSi_xO_y , La_2O_3 , ZrO_2 , HfO_2 , Ta_2O_5 , Pr_2O_3 and TiO_2 as listed in claim 10. These materials are well known in the art having higher dielectric constant (10 or higher) higher than that of silicon oxide (3.9).

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

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(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

4. Claim 1-4, 7 and 10 are rejected under 35 U.S.C. 102(e) as being anticipated by US Patent 6,335,554 by Yoshikawa.

Regarding to claim 1, Yoshikawa teaches a structure of a flash memory in fig. 4 comprising: a first oxide layer 13, a dielectric layer 14 having a high dielectric constant positioned on the first oxide layer, a second oxide layer 15 positioned on the dielectric layer having the high dielectric constant, wherein the first oxide layer, the dielectric layer having the high dielectric constant and the second oxide layer together form a charge trapping layer 4a/4b, a gate 3 located on the second oxide layer of the charge trapping layer, and a source /drain 10/11 region located at two lateral sides of the substrate 1.

Regarding to claim 2, Yoshikawa teaches a structure of a flash memory wherein the band gap of the dielectric layer having the high dielectric constant is smaller than that of silicon oxide (SiO_2), because of the inherent property of silicon nitride. Yoshikawa teaches that the dielectric layer 14 comprises silicon nitride, column 13 line 5-8. The band gap of silicon nitride is approximately 5 eV, while the band gap of silicon oxide is approximately 9 eV.

Regarding to claim 3-4, Yoshikawa teaches a structure of a flash memory wherein the dielectric layer 14 having the high dielectric constant is greater than 8, because of the inherent property of transition metal oxides, which has the dielectric constant approximately 30 or higher. Yoshikawa teaches that the metallic oxide such as TiO_2 , Ta_2O_5 , Al_2O_3 , PZT, and SBT can be used for dielectric layer 14, column 10 lines 10-13.

Regarding to claim 7, Yoshikawa teaches a structure of a flash memory in fig. 4 comprising: a first oxide layer 13, a dielectric layer 14 having a high dielectric constant positioned on the first oxide layer, wherein the dielectric layer having the high dielectric constant and the first oxide layer together form a charge trapping layer 4a/4b, a gate 3 located on the dielectric layer having the high dielectric constant, and a source /drain 10/11 region positioned at two lateral sides of the substrate 1.

Regarding to claim 10, Yoshikawa teaches a structure of a flash memory wherein the dielectric layer 14 having the high dielectric constant is selected from a group consisting of TiO_2 , Ta_2O_5 , Al_2O_3 , column 10 lines 10-13.

5. Claims 7 is rejected under 35 U.S.C. 102(e) as being anticipated by US Patent 5,357,134 to Shimoji.

Regarding to claim 7, Shimoji teaches a structure of a flash memory in fig. 6 comprising: a first oxide layer 12, a dielectric layer 15 having a high dielectric constant positioned on the first oxide layer, wherein the dielectric layer having the high dielectric constant, column 4 line 17-21, and the first oxide layer together form a charge trapping layer 15, a gate 20 located on the dielectric layer having the high dielectric constant, and a source /drain 21/22 regions positioned at two lateral sides of the substrate 1.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 5-6, 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent 6,335,554 by Yoshikawa, further in view of US Patent 6,340,827 to Choi et al.

Regarding to claim 5-6, 11-12, Yoshikawa does not teach the high dielectric constant 14 is a mixture or stacked of materials selected from a group comprising of Al_2O_3 , Y_2O_3 , ZrSi_xO_y , HfSi_xO_y , La_2O_3 , ZrO_2 , HfO_2 , Ta_2O_5 , Pr_2O_3 and TiO_2 . However, Choi's reference teaches the high dielectric constant 315, fig. 3 is a mixture or stacked of materials selected from a group comprising of lanthanum-based oxide (La_2O_3), zirconium-based oxide (ZrO_2), Ta_2O_5 , column 4 lines 52-67. At the time of the invention was made; it would have been obvious to one of ordinary skill in the art to combine the teaching of Choi's device with Yoshikawa, because such structure would have been considered a mere substitution of art-recognized equivalent values.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thao X Le whose telephone number is 703-306-0208. The examiner can normally be reached on 8:00 - 4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 703-306-2794. The fax phone numbers for the

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organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Thao X. Le
April 3, 2002


PHAT X. CAO
EXAMINER